

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re the Application of: Jitaru

Serial #: 09/434,985
Filed: 11/05/99

Docket #: 1675B.1A.1
Examiner:
Group:

For: Low Noise Full Integrated Multilayers Magnetic For Power
Converters

COLLECTION OF CLAIMS

Honorable Commissioner of Patents and Trademarks
Washington D.C. 20231

Sir:

For clarity of reference, the following is a list of the claims now pending in the above identified application.

From the Original Filing: (1-15)

- 1 1. A power processing device comprising:
- 2 a) a multilayer printed circuit board having multiple layers of
- 3 dielectric sheets;
- 4 b) a first transformer having,
- 5 1) a first core extending through said layers of dielectric
- 6 sheets, and,
- 7 2) a first set of electrically conductive windings, at least one
- 8 of said windings of said first set of electrically conductive
- 9 windings contained between two adjoining layers of said dielectric
- 10 sheets;
- 11 c) a second transformer having,
- 12 1) a second core extending through said layers of dielectric
- 13 sheets, and,

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1 2) a second set of electrically conductive windings, at least one
2 of said windings of said second set of electrically conductive
3 windings contained between two adjoining layers of said dielectric
4 sheets; and,

5 d) at least one electrically conductive trace extending between said
6 first set of electrically conductive windings and said second set of
7 electrically conductive windings, said at least one electrically conductive
8 trace totally contained between two adjoining layers of said dielectric
9 sheets.

1 2. The power processing device according to claim 1, further including
2 a first shielding layer disposed on a first exterior surface of said
3 multilayer printed circuit board above said first set of windings.

1 3. The power processing device according to claim 2, further including
2 a second shielding layer disposed on a second exterior surface of said
3 multilayer printed circuit board below said first set of windings.

1 4. The power processing device according to claim 1, wherein said first
2 set of electrically conductive windings and the second set of electrically
3 conductive windings are electrically encapsulated.

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1 5. The power processing device according to claim 4, wherein said at
2 least one electrically conductive trace is electrically encapsulated.

1 6. The power processing device according to claim 1,
2 a) wherein said first set of electrically conductive windings include
3 quiet windings; and,
4 b) wherein said first transformer further includes a secondary set of
5 windings positioned to have electrical flow induced therein by said first
6 core, said secondary set of windings positioned proximate to said quiet
7 windings.

1 7. The power processing device according to claim 1,
2 a) wherein said first transformer further includes a secondary set of
3 windings positioned to have electrical flow induced therein by said first
4 core; and,
5 b) further including an open loop positioned to inject a current through
6 parasitic capacitance in said secondary windings having a polarity opposite
7 that of current in said first set of windings.

1 8. The power processing device according to claim 1,
2 a) wherein said first transformer further includes a secondary set of
3 windings positioned to have electrical flow induced therein by said first
4 core; and,
5 b) further including an open loop positioned proximate and on a second
6 side of said secondary windings.

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1 9. The power processing device according to claim 1,
2 a) wherein said first transformer includes a secondary winding;
3 b) wherein said second transformer includes a secondary winding;
4 c) wherein the secondary winding of said first transformer and the
5 secondary winding of said second transformer are electrically connected in
6 parallel; and,
7 d) wherein the first set of electrically conductive windings and the
8 second set of electrically conductive windings are electrically connected in
9 series.

1 10. A power processing device comprising:
2 a) a multilayer printed circuit board having multiple layers of
3 dielectric sheets;
4 b) a transformer having,
5 1) a core extending through said layers of dielectric sheets, and,
6 2) a first set of electrically conductive windings, at least one
7 of said windings of said first set of electrically conductive
8 windings contained between two adjoining layers of said dielectric
9 sheets; and,
10 c) a first shielding layer disposed on a first exterior surface of said
11 multilayer printed circuit board above said first set of windings.

1 11. The power processing device according to claim 10, further
2 including a second shielding layer disposed on a second exterior surface of
3 said multilayer printed circuit board below said first set of windings.

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1 12. The power processing device according to claim 11, further
2 including an electrically conductive trace contained between two layers of
3 said dielectric sheets, said conductive trace communicating with said first
4 set of electrically conductive windings.

1 13. The power processing device according to claim 10, further
2 including:

3 a) a set of quiet windings contained within said first set of windings;
4 and,

5 b) a secondary set of windings positioned to have electrical flow
6 induced therein by said core, said secondary set of windings positioned
7 proximate to said quiet windings.

1 14. The power processing device according to claim 10, further
2 including:

3 a) a secondary set of windings positioned to have electrical flow
4 induced therein by said core; and,

5 b) an open loop positioned to inject a current through parasitic
6 capacitance in said secondary windings, said injected current having a
7 polarity opposite that of current in said first set of windings.

1 15. The power processing device according to claim 10, further
2 including:

3 a) a secondary set of windings positioned to have electrical flow
4 induced therein by said core; and,

5 b) further including an open loop positioned proximate and on a second
6 side of said secondary windings.

From the Preliminary Amendment: (claims 16-19)

1 16. A power processing device comprising:

2 a) a multilayer printed circuit board having multiple layers of
3 dielectric sheets; and,

4 b) a transformer having,

5 1) a core extending through said layers of dielectric sheets, and,

6 2) a first set of electrically conductive windings, at least one
7 of said windings of said first set of electrically conductive
8 windings contained between two adjoining layers of said dielectric
9 sheets, and at least one of said windings positioned on an
10 external surface of said multilayer printed circuit board.

1 17. The power processing device according to claim 16, further
2 including a first shielding layer disposed on an exterior surface of said
3 multilayer printed circuit board.

1 18. The power processing device according to claim 16, further
2 including an electrically conductive trace contained between two layers of
3 said dielectric sheets, said conductive trace communicating with said first
4 set of electrically conductive windings.

1 19. The power processing device according to claim 18, further
2 including at least one component secured to an exterior surface of said
3 multilayer printed circuit board at a location over said electrically
4 .conductive trace.

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From the Second Preliminary Amendment: (20-23)

- 1 20. A power processing device comprising:
- 2 a) a multilayer printed circuit board having multiple layers of
- 3 dielectric sheets;
- 4 b) a transformer having,
- 5 1) a first core extending through said layers of dielectric
- 6 sheets, and,
- 7 2) a first set of electrically conductive windings, at least one
- 8 of said windings of said first set of electrically conductive
- 9 windings contained between two adjoining layers of said dielectric
- 10 sheets;
- 11 c) an output choke having,
- 12 1) a second core extending through said layers of dielectric
- 13 sheets, and,
- 14 2) a second set of electrically conductive windings, at least one
- 15 of said windings of said second set of electrically conductive
- 16 windings contained between two adjoining layers of said dielectric
- 17 sheets; and,
- 18 d) at least one electrically conductive trace extending between said
- 19 first set of electrically conductive windings and said second set of
- 20 electrically conductive windings, said at least one electrically conductive
- 21 trace totally contained between two adjoining layers of said dielectric
- 22 sheets.

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1 21. The power processing device according to claim 20, further
2 including, an output choke having,

3 a) a third core extending through said layers of dielectric sheets;

4 b) a third set of electrically conductive windings, at least one of
5 said windings of said third set of electrically conductive windings contained
6 between two adjoining layers of said dielectric sheets; and,

7 c) at least one trace extending between said first set of electrically
8 conductive windings and said third set of electrically conductive windings,
9 said at least one trace totally contained between two adjoining layers of said
10 dielectric sheets.

1 22. A power processing device comprising:

2 a) a multilayer printed circuit board having multiple layers of
3 dielectric sheets;

4 b) a first magnetic element having,

5 1) a first core extending through said layers of dielectric
6 sheets, and,

7 2) a first set of electrically conductive windings, at least one
8 of said windings of said first set of electrically conductive
9 windings contained between two adjoining layers of said dielectric
10 sheets;

11 c) a second magnetic element having,

12 1) a second core extending through said layers of dielectric
13 sheets, and,

14 2) a second set of electrically conductive windings, at least one
15 of said windings of said second set of electrically conductive
16 windings contained between two adjoining layers of said dielectric
17 sheets; and,

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18 d) at least one electrically conductive trace extending between said
19 first set of electrically conductive windings and said second set of
20 electrically conductive windings, said at least one electrically conductive
21 trace totally contained between two adjoining layers of said dielectric
22 sheets.

1 23. The power processing device according to claim 20, further
2 including, a third magnetic element having,
3 a) a third core extending through said layers of dielectric sheets;
4 b) a third set of electrically conductive windings, at least one of
5 said windings of said third set of electrically conductive windings contained
6 between two adjoining layers of said dielectric sheets; and,
7 c) at least one trace extending between said first set of electrically
8 conductive windings and said third set of electrically conductive windings,
9 said at least one trace totally contained between two adjoining layers of said
10 dielectric sheets.

From the Third Preliminary Amendment: (24-32)

1 - - 24. The power processing device according to claim 22, further
2 including an active element secured to said multilayered printed circuit board
3 and connected to the first set of electrically conductive windings. - -

1 - - 25. The power processing device according to claim 24, further
2 including:
3 a) a heat sink connected to one face of said multilayered printed
4 circuit board opposing said active element; and,
5 b) a thermal via thermally connecting said active element and the heat
6 sink. - -

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1 - - 26. The power processing device according to claim 22, further
2 including:

3 a) a base plate having an active element thereon; and,
4 b) a lead communicating between the active element on said base plate
5 and said first set of electrically conductive windings. - -

1 - - 27. The power processing device according to claim 26, wherein said
2 electrically conductive trace in communication with said lead is totally
3 contained between two adjoining layers of said dielectric sheets. - -

1 - - 28. A power processing device comprising:

2 a) a multilayer printed circuit board having multiple layers of
3 dielectric sheets;

4 b) a magnetic element having,

5 1) a core extending through said layers of dielectric sheets, and,

6 2) a set of electrically conductive windings, at least one of

7 said windings of said set of electrically conductive windings

8 contained between two adjoining layers of said dielectric sheets;

9 c) at least one electrically conductive trace, each electrically
10 conductive trace communicating with one of said set of electrically conductive
11 windings and totally contained between two adjoining layers of said dielectric
12 sheets. - -

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1 - - 29. The power processing device according to claim 28, further
2 including an active element secured to said multilayered printed circuit board.
3 and connected to the set of electrically conductive windings. - -

1 - - 30. The power processing device according to claim 29, further
2 including:

3 a) a heat sink connected to one face of said multilayered printed
4 circuit board opposing said active element; and,

5 b) a thermal via thermally connecting said active element and the heat
6 sink. - -


1 - - 31. The power processing device according to claim 28, further
2 including:

3 a) a base plate having an active element thereon; and,

4 b) a lead communicating between the active element on said base plate
5 and said set of electrically conductive windings. - -

1 - - 32. The power processing device according to claim 31, wherein said
2 electrically conductive trace in communication with said lead is totally
3 contained between two adjoining layers of said dielectric sheets. - -

Respectfully Submitted,


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